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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/601,234 | 10/30/2000 | Kenichi Morigaki | MAT-799US | 8757 |

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| EXAMINER |
|---|
| TSANG FOSTER, SUSY N |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1745 | |

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/601,234 | MORIGAKI ET AL. | |
| | Examiner | Art Unit | |
| | Susy N Tsang-Foster | 1745 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *19 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *10 and 12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,11 and 13-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *11,17* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: . .

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of the silicon species as the central portion and the solid solution or intermetallic compound in Paper No. 16 and the nickel species as the additional element in Paper No. 19 are acknowledged. The traversal is on the ground(s) that claim 1 is generic. This is not found persuasive because election of species requirement can be made when specific species are claimed such as in depending claims 13, 14, and 16 where a plurality of species for the additional element are specifically recited and they are patentably distinct (see MPEP 808.01(a)).

The requirement is still deemed proper and is therefore made FINAL.

*2.* Claims 10 and 12 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 14 and in Paper No. 16.

### *Response to Amendment*

3. The Office Action is responsive to the amendments filed on 5/20/2002 and 12/9/2002. In the amendment filed on 5/20/2002, claims 1-9 were amended and claims 10-20 were added. In the amendment filed on 12/9/2002, claims 1 and 8 were amended. Claims 1-20 are pending. Claims 10 and 12 are withdrawn from consideration as being drawn to a non-elected species. Claims 1-9, 11, and 13-20 are rejected for reasons below.

***Information Disclosure Statement***

*4.* The information disclosures statement filed on 5/20/2002 and 12/26/200 have been considered by the Examiner.

***Specification***

5. The disclosure is objected to because of the following informalities: In the first line of the specification, the filing date of the international application is missing.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

6. Claims 1-9, 11, and 13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In claims 1 and 8, the limitation "at least one additional element" is new matter because the original disclosure is drawn to at least one additional element that was defined to be an element exclusive of the element included in the central portion (nuclear particle) and is selected from the group of elements in the Periodic Table comprising group 2 elements, transition metal elements, group 12 elements, group 13 elements and group 14 elements exclusive of carbon. The new limitation encompasses other elements such as carbon which is not part of applicant's original invention.

Claims depending from claims 1 and 8 are rejected for the same.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-9, 11 and 13-20 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Shimamura et al. (US 6,090,505).

The applied reference has a common inventor and common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

See abstract, col. 3, line 35 to col. 4, line 7; col. 4, lines 54-60; col. 5, lines 20-29; col. 9, lines 37-67; col. 10, lines 1-14; col. 13, lines 59-61; col. 16, lines 7-10 of the reference.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1, 3, 11, 13, 14, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 5,770,333) in view of Kawakami et al . (US 5,824,434).

Saito et al. (US 5,770,333) disclose a non-aqueous electrolyte secondary battery comprising a positive electrode and a negative electrode capable of interacting and de-intercalating lithium (col. 11, lines 28-56). In particular, lithium containing composite oxides for the positive electrode are disclosed in column 7, lines 60-64 of the reference. The negative electrode includes an intermetallic alloy $NiSi_2$ formed by vacuum melting Ni and Si and pulverizing the alloy to form a powder (col. 7, lines 38-43) and the negative electrode is formed by mixing the alloy powder with a binder (col. 7, lines 48-55). The positive electrode is formed by mixing $LiCoO_2$ with a binder (col. 7, lines 59-65). Since the same method and starting materials are used for the form the intermetallic alloy $NiSi_2$ powders in the reference as the method disclosed by the instant application for forming composite particles comprising a central portion consisting essentially of Si coated by an intermetallic compound or solid solution comprising Si and Ni (see Table 1, material J and page 14, lines 4- 14 of the applicants' specification), the intermetallic alloy $NiSi_2$ particles in Saito et al. are inherently composite

particles comprising a central portion consisting essentially of Si coated by an intermetallic compound comprising Si and Ni.

The court has held that claiming of a property or characteristic which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See also MPEP 2112 and 2112.01. When the Examiner has provided a sound basis for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

A separator is placed between the positive electrode and the negative electrode in the lithium battery formed (col. 14, lines 15-25).

Saito et al. does not disclose that a polymer gel electrolyte is used and that the polymer gel electrolyte comprises polyethylene oxide.

Kawakami et al. teach that a polymer gel electrolyte is used in a lithium battery instead of a separator because the use of a polymer gel electrolyte prevents leakage of liquid electrolyte from the battery and that a suitable polymer gel electrolyte comprises polyethylene oxide (see abstract and col. 20, lines 44-50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a polymer gel electrolyte comprising polyethylene oxide in the lithium battery

of Saito et al. instead of a separator because a polymer gel electrolyte comprising polyethylene oxide prevents leakage of liquid electrolyte from the battery.

11. Claims 1, 2, 4, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 5,770,333) in view of EP 730316 A1.

Saito et al. (US 5,770,333) disclose a non-aqueous electrolyte secondary battery comprising a positive electrode and a negative electrode capable of interacting and de-intercalating lithium (col. 11, lines 28-56). In particular, lithium containing composite oxides for the positive electrode are disclosed in column 7, lines 60-64 of the reference. The negative electrode includes an intermetallic alloy $NiSi_2$ formed by vacuum melting Ni and Si and pulverizing the alloy to form a powder (col. 7, lines 38-43) and the negative electrode is formed by mixing the alloy powder with a binder (col. 7, lines 48-55). The positive electrode is formed by mixing $LiCoO_2$ with a binder (col. 7, lines 59-65). Since the same method and starting materials are used for the form the intermetallic alloy $NiSi_2$ powders in the reference as the method disclosed by the instant application for forming composite particles comprising a central portion consisting essentially of Si coated by an intermetallic compound or solid solution comprising Si and Ni (see Table 1, material J and page 14, lines 4- 14 of the applicants' specification), the intermetallic alloy $NiSi_2$ particles in Saito et al. are inherently composite particles comprising a central portion consisting essentially of Si coated by an intermetallic compound comprising Si and Ni.

The court has held that claiming of a property or characteristic which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d

1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See also MPEP 2112 and 2112.01. When the Examiner has provided a sound basis for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

A separator is placed between the positive electrode and the negative electrode in the lithium battery formed (col. 14, lines 15-25).

Saito et al. do not disclose that the positive electrode includes a polymer gel electrolyte and the negative electrode includes a polymer gel electrolyte.

EP 730316 A1 teaches polyvinylidene (PVDF) homopolymer or polyvinylidene fluoride (PVDF) copolymer as the solid electrolyte material for a separator and for the positive and negative electrodes of a lithium battery with electrolyte material being present in the separator and in the electrodes (see page 13, lines 35-50) because the PVDF provides for a porous structure in the separator and in the electrodes that would increase the utilization of the active material and electrolyte material (see page 5, lines 24-29) due to enhanced electrolyte mobility from the porous structure. The PVDF copolymer can be copolymers of vinylidene fluoride and hexafluoropropylene (see page 4, lines 30-35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use PVDF homopolymer gel electrolyte or PVDF-HFP copolymer gel electrolyte as the polymer gel electrolyte in the battery of Saito et al. because the PVDF homopolymer gel electrolyte or PVDF-HFP copolymer gel electrolyte are stable and compatible in a lithium

battery environment and are conventionally used in the art. The use of these polymer gel electrolytes in the separator and in the electrodes also gives increased efficiency in the battery due to the porous structure of the polymer as taught by EP 730316 A1.

Furthermore, it would have also been obvious to one of ordinary skill in the art at the time the invention was made to use the polymer gel electrolyte in the electrodes of a lithium battery because the use of the same polymer matrix in the electrode and in the separator (solid electrolyte) ensures chemical compatibility of the polymer as a binder for the electrodes with the polymer electrolyte.

12. Claims 6 , 7, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 5,770,333) in view of Kawakami et al . (US 5824434) as applied to claims 1 and 14 above, and further in view of Gies et al. (USP 5,665,265).

Saito et al. (US 5,770,333) in combination with Kawakami et al . (US 5824434) teach all the limitations of claims 6, 7, 19, and 20 except that the polymer gel electrolyte includes a non-woven fabric of a polyolefin polymers, and that the polymer is a copolymer of methacrylate and an ethylene oxide.

Gies et al. teaches a polymer gel electrolyte that includes a non-woven fabric of polyolefin polymers (col. 3, lines 18-60) and that the polymer gel electrolyte can be polyethylene oxide, polymethylmethacrylate and copolymers thereof.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a polymer gel electrolyte include a non-woven fabric of polyolefin polymers for good mechanical integrity of the electrolyte as taught by Gies et al. (see col. 2, lines 15-20).

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to use a copolymer of methacrylate and an ethylene oxide as the polymer gel electrolyte in a lithium battery because the copolymer is capable of absorbing electrolyte species to form a gel polymer electrolyte and it is functionally equivalent to the polyethylene oxide used in the gel polymer electrolyte of the Kawakami et al. as taught by Gies et al. (col. 3, lines 44-58).

13. Claims 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 5,770,333) in view of Kawakami et al . (US 5824434) as applied to claims 1 and 14 above, and further in view of St. Aubyn Hubbard et al. (USP 5,460,903).

Saito et al. (US 5,770,333) in view of Kawakami et al . (US 5824434) teach all the limitations of claims 5 and 18 except that the polymer in the polymer gel electrolyte is a polyester polymer.

St. Aubyn Hubbard et al. teaches a polymer gel electrolyte comprising polyester polymer for a lithium battery (see abstract; col.2, lines 33-45; col. 3, lines 1-15, lines 35-41 and lines 65-67) because polymer gel electrolytes containing polyester as the polymer provides for mechanical rigidity.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use polyester as the polymer in the polymer gel electrolyte in the battery of JP 10-092424 A because polymer gel electrolyte comprising polyester has improved mechanical stability.

14. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (US 5,770,333) in view of Iwamoto et al. (USP 5,589,296).

Saito et al. (US 5,770,333) disclose a non-aqueous electrolyte secondary battery comprising a positive electrode and a negative electrode capable of interacting and de-intercalating lithium (col. 11, lines 28-56). In particular, lithium containing composite oxides for the positive electrode are disclosed in column 7, lines 60-64 of the reference. The negative electrode includes an intermetallic alloy $NiSi_2$ formed by vacuum melting Ni and Si and pulverizing the alloy to form a powder (col. 7, lines 38-43) and the negative electrode is formed by mixing the alloy powder with a binder (col. 7, lines 48-55). The positive electrode is formed by mixing $LiCoO_2$ with a binder (col. 7, lines 59-65). Since the same method and starting materials are used for the form the intermetallic alloy $NiSi_2$ powders in the reference as the method disclosed in the instant application for forming composite particles comprising a central portion consisting essentially of Si coated by an intermetallic compound or solid solution comprising Si and Ni (see Table 1, material J and page 14, lines 4- 14 of the applicants' specification), the intermetallic alloy $NiSi_2$ particles in Saito et al. are inherently composite particles comprising a central portion consisting essentially of Si coated by an intermetallic compound comprising Si and Ni.

The court has held that claiming of a property or characteristic which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See also MPEP 2112 and 2112.01. When the Examiner has provided a sound basis for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

A separator is placed between the positive electrode and the negative electrode in the lithium battery formed (col. 14, lines 15-25).

Saito et al. does not disclose that using a lithium ion conductive glass solid electrolyte instead of a separator and that the glass solid electrolyte is synthesized with row materials including a first component including at least a lithium sulfide, a second component including at least one of a silicon sulfide, a phosphor sulfide, and a boron sulfide, and a third component including at least one of lithium phosphate, lithium sulfate, lithium borate, and lithium silicate.

Iwamoto et al. teaches a solid electrolyte for a lithium battery (col. 1, lines 15-20; col. 2, lines 24-27; col. 13, lines 2-5) that is a lithium ion conductive glass solid electrolyte and that the glass solid electrolyte is synthesized with row materials including (see col. 2, lines 51-60) a first component including at least a lithium sulfide, a second component including at least one of a silicon disulfide (a silicon sulfide), diphosphorous pentasulfide (a phosphor sulfide), and a boron sulfide; and a third component including at least one of lithium phosphate, lithium sulfate, and lithium silicate (which is lithium orthosilicate) to give a solid electrolyte having a distinguished ion conductivity (col. 2, lines 5-11) and prevent leakage problems due to using liquid electrolytes (col. 1, lines 24-30).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the lithium ion conductive glass solid electrolyte of Iwamoto et al. that is synthesized with row materials including a first component including at least a lithium sulfide, a

second component including at least one of a silicon disulfide (a silicon sulfide), diphosphorous pentasulfide (a phosphor sulfide), and a boron sulfide; and a third component including at least one of lithium phosphate, lithium sulfate, and lithium silicate (which is lithium orthosilicate) in the battery of JP 10-092424 A because the glass solid electrolyte has a distinguished ion conductivity and prevents leakage problems due to using liquid electrolytes as taught by Iwamoto et al. (col. 1, lines 24-30).

***Conclusion***

15. Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Thursday from 9:30 AM to 8:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/01 June 2003

Susy Tsang Foster